Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
Amendment of Part 15 of the Commission's Rules for Unlicensed Operations in the Television Bands, Repurposed 600 MHz Band, 600 MHz Guard bands and Duplex Gap, and Channel 37	)	ET Docket No. 14-165 RM-11840

COMMENTS OF 6HARMONICS, AGILE NETWORKS, CAL.NET, DECLARATION NETWORKS GROUP, EVOLVE CELLULAR, FAIRSPECTRUM OY, NETWORK BUSINESS SYSTEMS INC., NEXTLINK INTERNET, PACKERLAND BROADBAND, RADWIN, RTO WIRELESS, SACRED WIND COMMUNICATIONS, INC., SKYLARK WIRELESS, VISTABEAM INTERNET, WATCH COMMUNICATIONS, AND WON COMMUNICATIONS SUPPORTING MICROSOFT CORPORATION'S PETITION FOR RULEMAKING

June 10, 2019

I. INTRODUCTION AND SUMMARY

The undersigned rural internet service providers, manufacturers, and organizations submit these comments in support of Microsoft's Petition for Rulemaking ("Petition"). We urge the Commission to support the expansion and improvement of broadband connectivity to rural America by issuing a Further Notice of Proposed Rulemaking proposing the practical rule changes Microsoft has identified.[1]

We work in states across the nation to bring reliable internet service to our communities by using wireless technologies to connect underserved and difficult-to-reach areas. Our communities are filled with students, parents, farmers, nurses, doctors, and small business owners for whom broadband access is a critical tool for economic advancement. As the Commission knows, the recent 2019 Broadband Deployment Report indicates that 26% of Americans living in rural areas—one in four people—lack access to reliable broadband service, compared to only 1.7% of Americans in urban areas.[2] Television White Spaces ("TVWS") technology gives rural broadband providers a powerful tool to address this challenge. It radically improves the economics of deploying new service because signals transmitted over TVWS frequencies travel much farther than is possible in other bands available to wireless broadband providers. This allows providers to deliver wireless service to large geographic areas that would otherwise be impossible to serve

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1 Petition for Rulemaking of Microsoft Corporation, ET Docket No. 14-165, RM-11840 (filed May 3, 2019) ("Petition").

2 *Inquiry Concerning Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion*, 2019 Broadband Deployment Report, FCC No. 19-44, GN Docket No. 18-238, ¶ 33 (rel. May 29, 2019).

economically, because it allows us to reach our more remote neighbors living in thinly populated areas with a more efficient physical infrastructure than would be required for networks using higher frequencies.

Microsoft has developed the proposals contained in its Petition through its work with us. These practical, real-world solutions are the fruit of our combined efforts to push further into rural areas. The undersigned rural broadband providers therefore strongly support the Petition, because these changes to the TVWS rules will significantly enhance our ability to connect rural Americans. As the Petition explains, the Commission can free up significant additional TVWS spectrum capacity by permitting (1) higher-power operation in less congested, rural areas; (2) higher-power operation on first-adjacent channels; (3) higher deployment heights above average terrain; (4) fixed devices on moveable platforms in certain geofenced areas; and (5) narrowband operations for Internet of Things ("IoT") applications in industries such as agriculture.

The Commission can adopt these rule changes without risking harmful interference to existing broadcasting services by adopting the technical and operational parameters described in the Petition. Like the Commission, we are committed to expanding broadband in rural communities and working to ensure no American is left behind in this new era of digital innovation. The spectrum already opened up through the TVWS proceeding has allowed us to begin the important work necessary to achieve that goal. The changes outlined in the Petition will allow us to build on that work and connect even more of rural America.

II. THE COMMISSION SHOULD ISSUE A FURTHER NOTICE OF PROPOSED RULEMAKING THAT PROPOSES CHANGES TO THE PART 15 RULES TO IMPROVE THE ABILITY OF INTERNET SERVICE PROVIDERS TO REACH CUSTOMERS IN RURAL AREAS.

The rule changes Microsoft proposes will improve the ability of rural broadband providers to provide service to difficult-to-reach areas and will open up TVWS technology to new groups of users and use cases. We submit these Comments to explain how each proposed rule change will support rural service providers' efforts to build networks and expand connectivity.

Increasing radiated power in less-congested areas. First, increasing the radiated power limit in less-congested areas from 40 dBm to 42 dBm[3] will allow network engineers to provide better access in challenging geographies and will give networks better coverage and flexibility. Increasing radiated power by allowing greater directional gain will directly improve the cost-to-coverage ratio for providers and allow them to serve more Americans by enabling more homes to be served from a single tower. Importantly, because increased radiated power would be matched by increased minimum separation distances from broadcasters' protected contours, this change would present no additional risk of harmful interference. The Commission's methodology for calculating separation distances to protect broadcasters has proven effective in the years since those rules were adopted, and this change would simply apply that same methodology across a larger range of power levels.

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[3] *See* Petition at 4.

Permitting higher power in first-adjacent channels. Microsoft's proposal to develop rules permitting higher-power TVWS device operations in first-adjacent channels would also open up important new opportunities for rural broadband providers. Current rules require 6 MHz of frequency separation or large physical distances from protection contours for our companies to use power levels we need to provide fixed broadband services.[4] Today's rules therefore require that we find three contiguous white space channels just to be able to use the one middle channel for our networks. However, broadcasters are spread across frequencies rather than being grouped in contiguous blocks of spectrum. The result is that, even in rural areas, finding three contiguous white spaces is often difficult, making many empty channels effectively unavailable for rural broadband—today's rules result in much of the band being used by neither broadcasters nor internet service providers, but instead lying fallow.

The Commission should adopt rules that allow this significant amount of fallow guard-band spectrum to be put to productive use—making even one or two more channels available will result in orders of magnitude of improved coverage capability for rural connectivity. The Commission could permit TVWS operations in first-adjacent channels without increasing the chance of harmful interference to broadcasters by adopting more stringent out-of-band-emissions masks. The FCC could also explore ways to allow our TVWS devices to operate closer to television transmitters, where the signal at the television receiver is sufficiently strong to prevent harmful interference, while preventing the use of

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[4] *See* 47 C.F.R. § 15.712(a)(2).

TVWS devices at the edge of broadcast contours.[5] Allowing TVWS database operators to use the more accurate Longley-Rice propagation model, which better accounts for the shielding effect of terrain, would facilitate adjacent-channel operations by producing more accurate signal strength predictions for both TVWS and broadcast signals in addition to facilitating more efficient use of TVWS spectrum overall.[6]

Allowing additional HAAT. The Commission should also permit fixed TVWS device operations at up to 500 meters height above average terrain ("HAAT"). Doing so will significantly improve signal coverage in rural areas and will reduce deployment cost and time.[7] The current limit of 250 meters, combined with the averaging function of the HAAT value, unnecessarily restricts TVWS device operators' ability to provide broadband service. It often blocks our companies from deploying on the hills or other terrain features that contain the only existing sites for structures and backhaul necessary to provide coverage to our communities or are the only feasible sites for such construction. By increasing the HAAT limit, the Commission would allow us to better use existing structures and terrain features for deployment, which would make service more affordable and more effective. The Petition's new proposed separation distances (calculated using a methodology the Commission has provided[8]), combined with its proposed coordination requirement, provide a specific plan for the Commission to increase the HAAT limit while preventing harmful

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5 *See* Petition at 7–8.

6 *See id.* at 9.

7 *See id.* at 11.

8 *See* 47 C.F.R. § 15.709(b)(2).

interference.[9] This increase will allow us to successfully deliver service to more customers in underserved areas.

Permitting TVWS operation in geofenced areas. Permitting fixed TVWS device operations on moveable platforms using geofencing technology will allow residents, students, and workers in rural areas to access the internet in communities where they otherwise might not always have reliable access.[10] Allband Communications' experimental operations in Hillman, Michigan using school bus deployments and Deere & Company's waiver for the use of fixed TVWS devices on mobile agricultural equipment demonstrate that fixed devices on mobile platforms can provide a crucial "last-mile" link to the internet in the places where it is most necessary.[11] These innovative deployments demonstrate that operations at the higher EIRP limits of fixed TVWS devices within a well-defined area pose no additional risk of harmful interference to broadcast users.

Adjusting FCC rules to support IoT. Finally, we support new rules to clarify application of TVWS spectrum for narrowband IoT applications to allow the benefits of IoT connectivity to reach more sectors of the economy in rural areas. For maximum clarity, the

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9 *See* Petition at 12–14.

10 *See id.* at 22.

11 *See* Matt Morgan, *Microsoft to Use TV White Space to Put Wi-Fi on Rural School Buses*, EdTech (May 2, 2018), https://edtechmagazine.com/k12/article/2018/05/microsoft-to-use-tv-white-space-to-put-wifi-on-rural-school-buses-; Application of Microsoft Corporation, Form 442 Exhibit 1: Experiment Description, ELS File No. 0049-EX-CM-2018, Call Sign WJ2XCD (filed Mar. 7, 2018); *Deere & Company Request for Limited Waiver of Part 15 Rules for Fixed White Spaces Device*, Order, 31 FCC Rcd. 2131 (2016).

Commission should permit a new type of device class—the narrowband TVWS device—to operate in TVWS spectrum.[12] The current rules include technical restrictions to protect against interference from higher-power TVWS devices using 6-MHz channels, but could be interpreted to inadvertently limit IoT applications at equivalent power levels. The Commission should define the new class of narrowband TVWS devices as fixed or personal/portable devices operating in a bandwidth of no greater than 100 kHz that incorporate a listen-before-talk spectrum access mechanism.[13] Using the technical parameters and restrictions outlined in the Petition, the Commission can enable new, innovative uses of TVWS spectrum in the agriculture, mining, and environmental monitoring sectors while continuing to protect existing users from harmful interference.

III. CONCLUSION

The Petition provides specific and well-defined interference prevention mechanisms for each of the proposed rule changes, and the Commission should move forward with an FNPRM that proposes incorporating these changes into the existing rules. Doing so will substantially improve access to broadband in our communities and will advance the Commission's goal of extending broadband connectivity to all Americans.

Respectfully submitted,

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[12] *See* Petition at 16.

[13] *See id.* at 18.

Kyle Quillen, CEO
Agile Networks
213 Market Avenue North, Suite 310
Canton, OH 44702

R. Cory Heigl, VP & General Manager
Packerland Broadband
105 Kent St.
Iron Mountain, MI 49801

R. Cory Heigl

Ken Garnett, CEO
Cal.net
P.O. Box 1041
Shingle Springs, CA 95682

Kennetty E Garnett

Lowell Feldman, Founder & CEO
Evolve Cellular
PO Box 569
Lockhart, TX 78644

Lowell Feldman

Bob Nichols, CEO
Declaration Networks Group
8245 Boone Boulevard, Suite 230
Vienna, VA 22182

Bob Nichols

Kari Hofmann, General Manager
Network Business Systems Inc.
23834 E. 1260th St
Geneseo, IL 61254

kari Hofmann

Heikki Kokkinen, CEO
Fairspectrum Oy
Itäinen Pitkäkatu 4,
20520 Turku, Finland

Heikki K

Adi Nativ, Vice President,
Global Business Development
RADWIN
900 Corporate Drive
Mahwah, NJ 07430

Ted Osborn, SVP
Nextlink Internet
95 Parker Oaks Ln.
Hudson Oaks, TX 76087

Ted B. Osborn

John W. Badal, CEO
Sacred Wind Communications, Inc.
875 US Highway 491
North Yatahey, NM 87375

John Badal

Steve Hubbard, CEO
RTO Wireless
945 Concord Street
Framingham, MA 01701

Steven Hubbard

Ryan Guerra, CEO
Skylark Wireless
4011 Garrott Street
Houston, TX 77006

Robert Wu, Ph.D, Founder and CEO
6Harmonics
21 Concourse Gate, Suites 2 &10
Ottawa, Ontario
Canada K2E 7S4

Robert Wu

Greg Jarman, Chief Operating Officer
Watch Communications
1805 North Dixie Highway
Lima, OH 45801

Matt Larsen, CEO
Vistabeam Internet
PO Box 2231
Scottsbluff, NE 69363

Matt Larsen

Matthew Thomas, Co-Founder
WON Communications
1900 LeCompte Rd. Building #15
Springfield, MO 65802

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CERTIFICATE OF SERVICE

The undersigned hereby certifies that a true and correct copy of these Comments has been served on Petitioner by serving Petitioner's counsel of record via email and first-class mail.

Paul Margie
pmargie@hwglaw.com
Paul Caritj
pcaritj@hwglaw.com
Harris, Wiltshire & Grannis LLP
1919 M Street NW, Suite 800
Washington, DC 20036
(202) 730-1300

Robert M. McDowell
rmcdowell@cooley.com
Cooley LLP
1299 Pennsylvania Avenue NW, Suite 700
Washington, DC 20004
(202) 842-7862

Bob Nichols

Bob Nichols, CEO
Declaration Networks Group
8245 Boone Boulevard
Suite 230
Vienna, VA 22182
202-251-8799
bob@declarationnetworks.com

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